

What is claimed is:

1. A translating contact lens having a central axis, an anterior surface and an opposite posterior surface having a first optical zone, the anterior surface comprising:
 - a second optical zone having a top edge and a lower edge; and
 - a ramped ridge zone capable of controlling contact lens position on an eye in primary gaze and/or translating amount across the eye when the eye changes from gazing at an object at a distance to gazing at an object at an intermediate distance or to gazing at a nearby object,wherein the ramped ridge zone is disposed below the second optical zone and includes an upper edge, a lower ramped edge, a latitudinal ridge that extends outwardly from the anterior surface, and a ramp that extends downwardly from the lower ramped edge to surrounding surface and has a curvature or slope that provides a varying degree of interaction between the ramped ridge zone and the lower eyelid depending on where the lower eyelid of the eye strikes the ramped ridge zone, and
wherein the lower eyelid of the eye is engaged with at least some portion of the ramped ridge zone at all times.
2. A translating contact lens of claim 1, wherein at least one of the first and second optical zones includes:
 - a distance vision zone for distance vision correction, the distance vision zone having a first area that is sufficient to overlay a substantial portion of the pupil of the eye and disposed in a first position within the optical zone so that the pupil is substantially subtended by the distance vision zone when gazing at a substantially horizontal point; and
 - a near vision zone for near vision correction, the near vision zone extending radially outward from the distance vision zone and having a second area that is sufficient to overlay a substantial portion of the pupil and disposed in a second position within the optical zone so that the pupil is substantially subtended by the near vision zone when gazing at a near vision point below the substantially horizontal point.
3. A translating contact lens of claim 2, wherein the anterior surface further comprises:
 - a ridge-off zone extending outwardly from the top edge of the second optical zone;

a transition zone extending from the lower edge of the second optical zone to the upper edge of the ramped ridge zone, wherein the transition zone provides a smooth transition from the ridge zone to the second optical zone; and
a lenticular zone, extending radially outward from the ridge-off zone and the lower ramped edge of the ramped ridge zone, that tapers to a narrow end where the posterior and anterior surfaces meet each other.

4. A translating contact lens of claim 3, wherein the curvature center of the distance vision zone is on or very close to the central axis.
5. A translating contact lens of claim 4, wherein prism effect caused by the deviation of the curvature center of the distance vision zone from the central axis is less or equal to 1 prism diopter.
6. A translating contact lens of claim 3, wherein the distance vision zone has an oval shape.
7. A translating contact lens of claim 3, wherein the ramped ridge zone comprises a first side edge and a second side edge, wherein the ridge-off zone extends outwardly from the top edge of the second optical zone, first side edge of the ramped ridge zone and the second side edge of the ramped ridge zone, and wherein the ridge-off zone has sufficient area so that the ridge-off zone, the second optical zone, the ramped ridge zone and the transition zone cover substantially all of the cornea of the eye.
8. A translating contact lens of claim 7, wherein the ramp is made of a curved surface having a radius of between 0.1 to 1.0 mm.
9. A translating contact lens of claim 8, wherein the radius is between 0.2 to 0.4 mm.
10. A translating contact lens of claim 2, wherein the entire ramped ridge zone is continuous in first derivative and/or in second derivative.
11. A translating contact lens of claim 10, wherein the ramped ridge zone is defined by a spline-based mathematical function or made of several different surface patches.
12. A translating contact lens of claim 2, wherein the anterior surface is continuous in first derivative and/or in second derivative from center to edge.
13. A translating contact lens of claim 2, wherein the latitudinal ridge has a non-uniformly varying elevation profile.
14. A translating contact lens of claim 13, wherein the latitudinal ridge has a mirror symmetry with respect to a plan which cut the latitudinal ridge in the middle into two equal parts and contains the central axis.
15. A translating contact lens of claim 2, wherein the contact lens is a soft contact lens.

16. A translating contact lens of claim 1, wherein at least one of the first and second optical zones includes:
- a distance vision zone for distance vision correction, the distance vision zone having a first area that is sufficient to overlay a substantial portion of the pupil of the eye and disposed in a first position within the optical zone so that the pupil is substantially subtended by the distance vision zone when gazing at a substantially horizontal point;
 - an intermediate vision zone for intermediate vision correction, the intermediate vision zone extending radially outward from the distance vision zone and having a second area that is sufficient to overlay a substantial portion of the pupil and disposed in a second position within the optical zone so that the pupil is substantially subtended by the intermediate vision zone when gazing at an intermediate vision point below the substantially horizontal point; and
 - a near vision zone for near vision correction, the near vision zone extending radially outward from the intermediate vision zone and having a third area that is sufficient to overlay a substantial portion of the pupil and disposed in a third position within the optical zone so that the pupil is substantially subtended by the near vision zone when gazing at a near vision point below the intermediate vision point.
17. A translating contact lens of claim 16, wherein the anterior surface further comprises:
- a ridge-off zone extending outwardly from the top edge of the second optical zone;
 - a transition zone extending from the lower edge of the second optical zone to the upper edge of the ramped ridge zone that provides a smooth transition from the ridge zone to the second optical zone; and
 - a lenticular zone, extending radially outward from the ridge-off zone and the lower edge of the ridge zone, that tapers to a narrow end where the posterior and anterior surfaces meet each other.
18. A translating contact lens of claim 17, wherein the ramped ridge zone comprises a first side edge and a second side edge, wherein the ridge-off zone extends outwardly from the top edge of the second optical zone, first side edge of the ramped ridge zone and the second side edge of the ramped ridge zone, and wherein the ridge-off zone has sufficient area so that the ridge-off zone, the second optical zone, the ramped ridge zone and the transition zone cover substantially all of the cornea of the eye.
19. A translating contact lens of claim 16, wherein the entire ramped ridge zone is continuous in first derivative and/or in second derivative.

20. A translating contact lens of claim 19, wherein the ramped ridge zone is defined by a spline-based mathematical function or made of several different surface patches.
21. A translating contact lens of claim 16, wherein the anterior surface is continuous in first derivative and/or in second derivative from center to edge.
22. A translating contact lens of claim 16, wherein the latitudinal ridge has a non-uniformly varying elevation profile.
23. A translating contact lens of claim 22, wherein the latitudinal ridge has a mirror symmetry with respect to a plan which cut the latitudinal ridge in the middle into two equal parts and contains the central axis.
24. A translating contact lens of claim 16, wherein the contact lens is a soft contact lens.
25. A translating contact lens of claim 16, wherein the intermediate vision zone is a progressive power zone having an optical power that continuously changes from distant vision to near vision.
26. A translating contact lens of claim 1, wherein at least one of the first and second optical zones includes a cylindrical optical surface to correct astigmatism.
27. A translating contact lens of claim 26, wherein the anterior surface further comprises:
 - a ridge-off zone extending outwardly from the top edge of the second optical zone;
 - a transition zone extending from the lower edge of the second optical zone to the upper edge of the ramped ridge zone that provides a smooth transition from the ridge zone to the second optical zone; and
 - a lenticular zone, extending radially outward from the ridge-off zone and the lower ramped edge of the ramped ridge zone, that tapers to a narrow end where the posterior and anterior surfaces meet each other.
28. A translating contact lens of claim 27, wherein the ramp is made of a curved surface having a radius of between 0.1 to 1.0 mm.
29. A translating contact lens of claim 27, wherein the entire ramped ridge zone is continuous in first derivative and/or in second derivative.
30. A translating contact lens of claim 29, wherein the ramped ridge zone is defined by a spline-based mathematical function or made of several different surface patches.
31. A translating contact lens of claim 27, wherein the anterior surface is continuous in first derivative and/or in second derivative from center to edge.
32. A translating contact lens of claim 27, wherein the latitudinal ridge has a non-uniformly varying elevation profile.

33. A translating contact lens of claim 32, wherein the latitudinal ridge has a mirror symmetry with respect to a plan which cut the latitudinal ridge in the middle into two equal parts and contains the central axis.
34. A translating contact lens of claim 27, wherein the contact lens is a soft contact lens.
35. A translating contact lens of claim 1, wherein at least one of the first and second optical zones includes a first portion for distant vision correction and a second portion beneath the first portion for near vision correction.
36. A translating contact lens of claim 2, wherein the second portion is disposed beneath the central axis.
37. A translating contact lens of claim 35, wherein the anterior surface further comprises:
 - a ridge-off zone extending outwardly from the top edge of the second optical zone;
 - a transition zone extending from the lower edge of the second optical zone to the upper edge of the ramped ridge zone that provides a smooth transition from the ridge zone to the second optical zone; and
 - a lenticular zone, extending radially outward from the ridge-off zone and the lower ramped edge of the ramped ridge zone, that tapers to a narrow end where the posterior and anterior surfaces meet each other.
38. A translating contact lens of claim 37, wherein the entire ramped ridge zone is continuous in first derivative and/or in second derivative.
39. A translating contact lens of claim 38, wherein the ramped ridge zone is defined by a spline-based mathematical function or made of several different surface patches.
40. A translating contact lens of claim 37, wherein the anterior surface is continuous in first derivative and/or in second derivative from center to edge.
41. A translating contact lens of claim 37, wherein the latitudinal ridge has a non-uniformly varying elevation profile.
42. A translating contact lens of claim 41, wherein the latitudinal ridge has a mirror symmetry with respect to a plan which cut the latitudinal ridge in the middle into two equal parts and contains the central axis.
43. A translating contact lens of claim 37, wherein the contact lens is a soft contact lens.
44. A translating contact lens of claim 35, wherein at least one of the first and second optical zones includes a first portion for distant vision correction, a second portion beneath the first portion for intermediate vision correction, and a third portion beneath the second portion for near vision correction.

45. A translating contact lens of claim 44, wherein the second portion has an optical power that continuously changes from distant vision to near vision.
46. A method for producing a translating contact lens, comprising the steps of shaping a contact lens by a manufacturing means to have a central axis, an anterior surface and an opposite posterior surface, wherein the posterior surface has an optical zone, wherein the anterior surface includes an optical zone and a ramped ridge zone capable of controlling contact lens position on an eye in primary gaze and/or translating amount across the eye when the eye changes from gazing at an object at a distance to gazing at an object at an intermediate distance or at a nearby object, wherein the ramped ridge zone is disposed below the optical zone and includes an upper edge, a lower ramped edge, a latitudinal ridge that extends outwardly from the anterior surface, and a ramp that extends downwardly from the lower ramped edge and has a curvature or slope that provides a varying degree of interaction between the ramped ridge zone and the lower eyelid depending on where the lower eyelid strikes the ramped ridge zone.
47. A method of claim 46, wherein the anterior surface is continuous in first derivative and/or in second derivative from center to edge.
48. A method of claim 47, wherein the latitudinal ridge has a non-uniformly varying elevation profile.
49. A method of claim 48, wherein the latitudinal ridge has a mirror symmetry with respect to a plan which cut the latitudinal ridge in the middle into two equal parts and contains the central axis.
50. A method of claim 46, wherein said manufacturing means is a numerically controlled lathe or molds.